

BASIS FOR THE AMENDMENT

The specification has been amended at page 6, lines 15-19, as supported by Claim 5 and the same paragraph in the specification.

The amendment at page 58 is supported at page 58, line 24 and lines 16 and 17.

Claims 9, 19 and 23 have been amended to recite proper Markush language.

New Claims 27 and 28 have been added.

New Claim 27 is supported by Claims 1 and 3 as originally filed and by the formula at page 13 of the specification and by Synthesis Example 1 at page 65 of the specification.

New Claim 28 is supported by Claims 1, 3, 4 and 5 as originally filed.

Claims 24-26 have been withdrawn from further consideration.

No new matter is believed to have been added by entry of this amendment. Entry and favorable reconsideration are respectfully requested.

Upon entry of this amendment Claims 1-28 will now be active in this application.

INTERVIEW SUMMARY

Applicants wish to thank Examiner Dote for the helpful and courteous discussion with Applicants' Representative on April 6, 2005. During this discussion it was noted that reference characters 22 and 23 of Figure 10 are a rotating shaft of the charger (specification at page 58, line 24) and a charging area of the charger (page 58, lines 16, 17), respectively.

Regarding the objection to the specification in connection with Claim 5, Applicants have amended the specification as discussed as supported at page 6, lines 15-19, of the specification.

Claims 9, 19 and 23 have been amended to recite proper Markush language as discussed.

In addition, the rejections over Niimi, Nukuda et al and Takaya et al, Yang et al and Takaya et al were discussed.

REMARKS

Applicants respectfully request reconsideration of the application, as amended, in view of the following remarks.

When a photoreceptor is prepared using a solvent other than halogen-containing solvents in view of environmental protection, the resultant photoreceptor has poor electrostatic properties. As a result of the present inventor's investigation, the following has been discovered. When a charge transport layer (CTL) is coated on a charge generation layer (CGL), the charge generation material (CGM) in the CGL aggregates, and thereby the specific area of the CGM decreases. Therefore, the chance of contact of the charge transport material (CTM) with the CGM decreases. As a result thereof, the photo-carrier generation efficiency and the optical sensitivity of the photoreceptor deteriorate.

The particle diameter of the CGM is specified in the present application, and thereby the aggregation of the CGM can be prevented. Therefore, by using the present invention, a photoreceptor having good electrostatic properties can be produced even when the photoreceptor is prepared using a solvent other than halogen-containing solvents. The cited references are silent on production of a photoreceptor using a solvent other than halogen-containing solvents; the problems to be solved in the case where a solvent other than halogen-containing solvents is used; the mechanism of deterioration of the electrostatic properties caused when such a solvent is used; and the solution therefore.

The present invention as set forth in **amended Claim 1** relates to a photoreceptor, comprising:

an electroconductive substrate;

a charge generation layer located overlying the electroconductive substrate optionally with an intermediate layer therebetween; and

a charge transport layer formed overlying the charge generation layer using a non-halogenated solvent and comprising a charge transport material and a resin;

wherein the charge generation layer comprises

a polyvinyl acetal resin, and

a charge generation material having an average particle diameter less than a roughness of a surface of either the electroconductive substrate or the intermediate layer, on which the charge generation layer is located.

The present invention as set forth in **new Claim 27** relates to a photoreceptor, comprising:

an electroconductive substrate;

a charge generation layer located overlying the electroconductive substrate optionally with an intermediate layer therebetween; and

a charge transport layer formed overlying the charge generation layer using a non-halogenated solvent and comprising a charge transport material and a resin;

wherein the charge generation layer comprises

a polyvinyl acetal resin, and

a titanyl phthalocyanine having an average particle diameter less than a roughness of a surface of either the electroconductive substrate or the intermediate layer, on which the charge generation layer is located;

provided that said titanyl phthalocyanine is not an ammonia complex of titanyl phthalocyanine.

The present invention as set forth in **new Claim 28** relates to a photoreceptor, comprising:

an electroconductive substrate;

a charge generation layer located overlying the electroconductive substrate optionally with an intermediate layer therebetween; and

a charge transport layer formed overlying the charge generation layer using a non-halogenated solvent and comprising a charge transport material and a resin;

wherein the charge generation layer comprises

a polyvinyl acetal resin, and

a titanyl phthalocyanine having an average particle diameter less than a roughness of a surface of either the electroconductive substrate or the intermediate layer, on which the charge generation layer is located,

wherein the titanyl phthalocyanine has an X-ray diffraction spectrum in which a maximum peak is observed at a Bragg (2θ) angle of $27.2^\circ \pm 0.2^\circ$ when a Cu-K α X-ray having a wavelength of 1.542 Å is used,

wherein the titanyl phthalocyanine further has a lowest angle peak at an angle of $7.3^\circ \pm 0.2^\circ$, and wherein an interval between the lowest angle peak to a next peak at a high angle side is not less than 2.0° .

Yang et al and Takaya et al do not provide a motivation for the combination of the charge generation material having an average particle diameter less than a roughness of a surface of either the electroconductive substrate or the intermediate layer and a charge transport layer formed using a non-halogenated solvent.

In order to protect environment, it is desired not to use a halogenated solvent when a photoreceptor is produced, particularly when a charge transport layer is prepared (because a large amount of solvent is used for preparing a charge transport layer). The object of the present invention is to prepare a charge transport layer without using a halogenated solvent. If a halogenated solvent is merely replaced with a non-halogenated solvent, the resultant

photoreceptor is inferior in characteristics (such as photosensitivity). The reason therefore is as follows.

When a charge transport layer coating liquid including a non-halogenated solvent is coated on a charge generation layer, the charge generation material therein aggregates due to the solvent and thereby the specific surface area of the charge generation material decreases. Therefore, the probability that the charge generation material contacts with the charge transport material decreases, resulting in deterioration of photo-carrier generation efficiency, i.e., deterioration of photosensitivity. Therefore, it is necessary to prevent occurrence of aggregation of the charge generation material to avoid the photosensitivity deterioration problem. This can be achieved by controlling the surface roughness of the intermediate layer and the particle size of the charge generation material, the charge generation material aggregation problem can be avoided.

In other words, only after the following four points are understood, the present invention can be made:

- 1) to use a non-halogenated solvent;
- 2) when a non-halogenated solvent is used for preparing a charge transport layer on a charge generation layer, the charge generation material aggregates;
- 3) when the charge generation material aggregates, the photosensitivity of the resultant photoreceptor deteriorates; and
- 4) by controlling the surface roughness and the particle size of charge generation material, the charge generation material aggregation problem can be avoided.

Since these points are not disclosed and suggested in the references, the present invention is not obvious.

Specifically, there is no disclosure in these references that agglomeration of the charge generation layer can be avoided as disclosed at pages 17 and 18 of the specification.

There is also no disclosure of the superior results obtained in the Examples of the present invention. See pages 82-84 of the specification.

In addition, the Examiner has not provided a reference showing a charge generation material having an average particle diameter less than a roughness of a surface of the electroconductive substrate.

Moreover, the titanyl phthalocyanine (TiOPc) of the present invention is different from that of Yang et al. TiOPc of Yang et al is ammonia modified TiOPc which has been excluded from new Claim 27.

The formula of the ammonia complex of titanyl phthalocyanine is illustrated in FIG. 2 of Yang et al. Specifically, the nitrogen atom of an ammonia molecule is bonded with the center metal (Ti) of the titanyl phthalocyanine by a coordination bond. The hydrogen atoms of the ammonia molecule are bonded with an oxygen of the titanyl phthalocyanine molecule by hydrogen bond. Thus, an ammonia complex is formed.

In contrast, the TiOPc of the present invention has the formula illustrated in paragraph [0070] of the publication of this application. Therefore, it is clear that the TiOPc of the present invention is different in formula from the ammonia complex of titanyl phthalocyanine.

Further, the ammonia complex of titanyl phthalocyanine is prepared by a method described in FIG. 7 of Yang et al and Claim 2 of Yang et al. Specifically, the ammonia complex is prepared by subjecting an amorphous TiOPc to a crystal change treatment in an organic solvent including ammonia. Therefore, in order to prepare the ammonia complex of titanyl phthalocyanine having the formula illustrated in FIG. 2 of Yang et al, ammonia has to be actively used in at least one process of the preparation method of the ammonia complex of titanyl phthalocyanine.

In contrast, it is clear from Synthesis Example 1 of the present application that when the TiOPc of the present invention is synthesized, ammonia is not used in the synthesizing processes, i.e., the crude TiOPc preparation process, the acid pasting process and the crystal change process. Therefore, the ammonia complex of titanyl phthalocyanine having the formula illustrated in FIG. 2 of Yang et al is never prepared by the method used in the present invention. Thus, ammonia modified TiOPc has been excluded from new Claim 27.

Yang et al appears to distinguish from US 4,898,799 cited during the prosecution of Yang et al. The '799 patent has TiOPc and not ammonia modified TiOPc.

The material of the present invention is different from that of Yang. FIG. 1 of Yang et al illustrates titanylphthalocyanine and FIG. 2 illustrates an ammonia complex of titanylphthalocyanine. As can be seen from these Figures, the compounds have different structures. Specifically, there are many phthalocyanine compounds having a different center metal, and/or a different crystal form. These compounds have different electrophotographic properties. The properties of a phthalocyanine compound can be determined only by experiments at the present time. Therefore, although the X-ray pattern of the ammonia complex of titanylphthalocyanine of Yang may be similar to that of the titanylphthalocyanine, the titanylphthalocyanine of the present invention is not obvious.

Niimi, Nukuda et al and Takaya et al, fail to disclose or suggest the combination of the charge generation material having an average particle diameter less than a roughness of a surface of either the electroconductive substrate or the intermediate layer and a charge transport layer formed using a non-halogenated solvent.

The **alumina filler** of Niimi **does not have to be α -alumina** as asserted by the Examiner based on the specific resistivity. In other words, alumina can have a specific resistivity in the order of $2.5 \times 10^{12} \Omega \text{ cm}$ and not be α -alumina.

Also, the **XRPD patterns of the titanyl phthalocyanine** of the present invention are different from those of Nukuda et al. The Examiner has acknowledged this as she has not rejected Claims 4 and 5 over Nukuda et al. Thus, at least Claim 28 should be allowable over Nukuda et al.

Therefore, the rejection of Claims 1-6, 8 and 16 under 35 U.S.C. § 103(a) as being unpatentable over Yang (US 5,567,559) combined with Takaya (US 6,623,899 B2), the rejection of Claim 9 under 35 U.S.C. § 103(a) as being unpatentable over Yang (US 5,567,559) combined with Takaya (US 6,623,899 B2) and Tamura (US 5,496,671), the rejection of Claims 10-14 under 35 U.S.C. § 103(a) as being unpatentable over Yang (US 5,567,559) combined with Takaya (US 6,623,899 B2) and US 2002/0076633 A1, the rejection of Claims 17 and 19-23 under 35 U.S.C. § 103(a) as being unpatentable over Niimi (US 2002/0051654 A1) combined with Yang and Takaya, the rejection of Claims 1-3, 7, 10-14, 16-20, 22 and 23 under 35 U.S.C. § 103(a) as being unpatentable over Niimi '633 combined with Nukada (US 6,268,096 B1) and Takaya are believed to be unsustainable as the present invention is neither anticipated nor obvious and withdrawal of these rejections is respectfully requested.

Regarding the provisional obviousness-type double patenting rejections, Applicants wish to draw the Examiners attention to the MPEP which instructs the Examiner to withdraw the provisional rejection if it is the only issue remaining in one case and convert the provisional rejection in the other application to a double patenting rejection. MPEP 822.01.

Furthermore, all inventors designated in this application were employees of Ricoh Co., Ltd. and under obligation to assign the results of their research to Ricoh Co., Ltd. at the time the invention was made.

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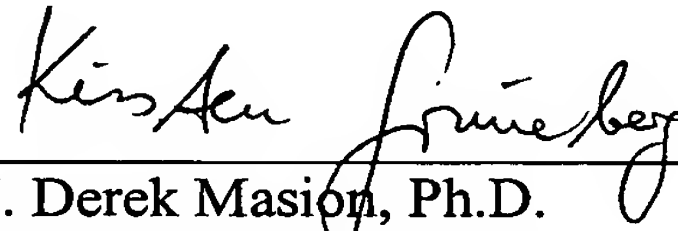
Reply to the Office Action dated: January 25, 2005

A copy of the IDS/List of Related Cases as filed June 27, 2003, including the date-stamped filing receipt were filed on February 10, 2005, as requested by the Examiner. A copy of the date-stamped filing receipt of February 10, 2005, is attached herewith.

This application presents allowable subject matter, and the Examiner is kindly requested to pass it to issue. Should the Examiner have any questions regarding the claims or otherwise wish to discuss this case, he is kindly invited to contact Applicants' below-signed representative, who would be happy to provide any assistance deemed necessary in speeding this application to allowance.

Respectfully submitted,

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